

**Pneumatic Dense-Phase Conveyor PTA
(pulse cycle type)
incl. PulseLine activators (option)
and control system (e.g. STP 51)**

Operating Instructions

To be kept for future use

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1 INTRODUCTION

These operating instructions have been specially generated for the circle of persons charged with the assembly, disassembly, commissioning, operation and repair of the pneumatic dense-phase conveyor PTA (pulse cycle type). A safe and troublefree operation of the machine can be obtained only when observing all information contained in these operating instructions. The non-observance of any of this information and instructions and, especially, the chapter concerning safety and all further safety information contained therein can result in hazards and risks for the life and limbs of the operator's staff or of the servicing staff and all other persons that stay or work in the vicinity of the machine. The non-observance of these operating instructions can also result in damages to the machine or the surrounding equipment and facilities. The pneumatic dense-phase conveyor has been designed for the integration into a bigger system and is not an immediately employable product therefore.

These operating instructions must always be at hand near the place of operation of the machine. The manufacturer of the machine refuses to assume any liabilities for damages, operating troubles and/or breakdowns resulting from the non-observance of these operating instructions. We reserve the right to make modifications to the machine for the purpose of its advancement and further perfecting.

Regarding some parts of the equipment used and delivered with the machine, these operating instructions may contain different information and instructions. To learn the equipment variant(s) realised with the machine described herein, please refer to the related equipment specification sheet.

2 SAFETY

The operator must take care to ensure that all persons charged with the assembly, disassembly, commissioning, operation, maintenance, servicing and repair of the device, have read these operating instructions, which particularly applies to the chapter on safety and all further safety information contained in these instructions. The same applies also with regard to the control system used with the device (control system STP-51, for ex.) and the operating instructions established by the manufacturers of other equipment that is delivered along with the pneumatic dense-phase conveyor, such as, for example, the inlet- or outlet valve.

2.1 SAFETY SYMBOLS



This prohibition sign has been applied to all dangerous spots and places on the pneumatic conveying machine. It indicates to the user that **an increased level of attentiveness** needs to be executed. Always make sure to comply **imperatively and without any fail** with the corresponding **safety information** specified in these operating instructions.



Danger

This hazard warning sign has been used to mark all safety information of particular importance in these operating instructions. Any such information must be complied with **by all means**. The non-compliance with any such information may result in **injuries** to the operator or user.



Caution

This warning sign has been used to mark all safety information of particular importance in these operating instructions. It has been applied to indicate that the related information must be strictly complied with in order to prevent from **damages to the system or to the machine**.

2.2 SPECIFIED APPLICATION

The pneumatic dense-phase conveyor described herein may constitute hazards or risks if it is used in an improper or careless manner or if it is used for purposes not within the limits of the intended use the machine has been specified for. The conveyor may only be used for the conveyance of dusty up to coarse-grained types of bulk materials. The construction and design of the conveying system corresponds to the material to be conveyed as sampled and described precisely upon order placing. Any use beyond that will be considered as not intended. Changes or mutations of the physical characteristics of the bulk material to be conveyed, such as changes or mutations in regard to its granulation or moisture content, can change the conveying characteristics vis-à-vis the initially provided design purposes. The manufacturer refuses to assume any liabilities for any damages consequent to any such mutations or changes. Unauthorized modifications or alterations that result in the impairment or disturbance of the safety and/or proper functioning of the pneumatic conveyor are prohibited. Owing to its pressure vessel based design, the pneumatic conveyor described herein is in many other countries subject to special pressure vessel regulations. Modifications or alterations of the device may result in the extinguishment of the operating licence.

2.3 SAFETY HAZARDS

Prior to all works be performed on the pneumatic conveyor, such as assembly, maintenance, cleaning, etc., care must be taken to ensure that the device is in absolutely idle condition and that the blow vessel (pressure vessel) is unpressurized. With all works requiring to render the existing safety devices and appliances inoperative beforehand, care must be taken to ensure that the blow vessel is not under pressure and that no material can get into or out of the blow vessel and the conveying pipes in an uncontrolled manner and that the compressed air supply is disconnected. Prior to all assembly-, disassembly- or servicing works, the power supply too must be disconnected. Beyond that, the power supply needs to be protected against an unintentional reclosure (by means of a lockable switch for example - not included in the scope of the delivery). Never remove any safety devices and/or appliances nor render them inoperative by making any unauthorised modifications or alterations to the machine!

2.4 ADVICE CONCERNING RESIDUAL RISKS

The pneumatic dense-phase conveyor PTA is delivered by its manufacturer in a non employable condition. It may only be operated after its professional assembly and installation and only after the expert connection of the required mechanical connections. The same also applies with regard to the expert and workmanlike connection of all electrical and pneumatic equipment to the related supply networks through the operator of the machine. The operator must also take all precautions that are needed in order to ensure that no unauthorised persons can perform any works on the pneumatic conveyor, put it into operation or perform any other works on it whatsoever.

2.5 SAFETY INFORMATION FOR THE OPERATOR

All works performed on or with the device may only be carried out by duly trained or instructed personnel. The operator must equip the machine with an appropriate emergency shutdown. Each time after the completion of the electrical installation or after repair works, all actually mounted protective devices and all precautions implemented, need to be checked (e.g. safety limit switches, earthing, etc.). In addition to the present operating instructions, generally applicable legal and other binding regulations for the prevention of accidents and regulations concerning the environmental protection too need to be followed and complied with and their observance be instructed.

Greatest attention must be paid to the control and maintenance of the safety valve fitted on the blow vessel!

2.6 NOISE EMISSIONS

The A-weighted equivalent continuous sound intensity level of this machine comes to a value below 70 dB(A) (measured without product charge). This limit applies with regard to a distance of one meter to the outside of the blow vessel and a point in a height of 1.6 meters above the outlet of the machine.

2.7 WORKPLACES

Owing to the fact that the machine is delivered in non-employable condition, no specific workplaces can be determined beforehand. The determination of the individual workplaces depends on and is subject to the integration of the machine into the overall system.

3 SCOPE OF DELIVERY

In addition to the basic design of the dense-phase conveyor, different solution options can be realised with regard to the outlet- or exhaust valves of the device (e.g. installation of a diaphragm valve, pinch valve, ball valve, butterfly valve or cut-off slides (slide valves)).

The following table provides an overview of the extras and special components the delivered dense-phase conveyor PTA has been equipped with.

An explanation of the role of the different solution options can also be learned from these operating instructions. Regarding individual components, such as the inlet flap, the outlet valve, the exhaust valve and the control system, please refer to the also provided operating instructions established by the manufacturers of these devices.

3.1 SINGLE OR DOUBLE BLOW VESSEL

- ☐ Single blow vessel
- ☐ Double blow vessel

3.2 BLOW VESSEL CLOSING DEVICE (INLET SIDE)

- | | |
|--|--|
| ☐ D butterfly valve | see separate operating instructions |
| ☐ KG1 | calotte-type closing device
(specially suited for the conveyance of granules) |
| ☐ | see separate operating instructions |
| | see separate operating instructions |

3.3 OUTLET

- | | |
|---|-------------------------------------|
| ☐ Without outlet valve | |
| ☐ Pinch valve | see separate operating instructions |
| ☐ | see separate operating instructions |
| ☐ Pulsator, long | |
| ☐ Pulsator, short | |

3.4 BLOW VESSEL (PRESSURE VESSEL)

- | | |
|---|-------------------------------------|
| Type / size / capacity:..... | |
| ☐ Excess pressure switch / monitor P3 (option) | see separate operating instructions |
| ☐ Signalling probe "level high" (LH) | see separate operating instructions |
| ☐ Signalling probe "level low" (LL) (option) | see separate operating instructions |
| ☐ Fluidization (Option) | |
| ☐ | |

3.5 VENTING OF THE BLOW VESSEL

- | | |
|--|-------------------------------------|
| ☐ Pinch valve | see separate operating instructions |
| ☐ Diaphragm valve | see separate operating instructions |
| ☐ | |

3.6 ASSEMBLY OF CONVEYING AIR FITTINGS

- | | |
|---|-------------------------------------|
| ☐ Pressure regulator | see separate operating instructions |
| ☐ Purge air | |
| ☐ Air for fluidization | |

3.7 CONVEYING LINE

- ☐ Conveying line
- ☐ Activators
Available on option or to be provided by the customer:
- ☐ Dedusting facility required
for blow vessel venting see separate operating instructions
- ☐ Conveying air dedusting facility see separate operating instructions
- ☐ PulseLine activators

3.8 CONTROL SYSTEM

- ☐ Control system (e.g. STP-51) see separate operating instructions
- ☐

3.9 OTHER

- ☐

3.10 INFORMATION CONCERNING THE ENCLOSED OPERATING INSTRUCTIONS

The original operating instructions established by the manufacturers of the various parts, elements and components installed in or attached to the machine, such as the blow vessel closing devices, the outlet valves, the exhaust valves, the contact pressure gauge, the safety valves, solenoid valves, limit switches, pressure switches and level probes are all delivered enclosed with the machine. These operating instructions contain also a list of the related spare and wear parts.

- 3 Exhaust valve
- 4 Butterfly valve drive
- 5 Bottom air connection
- 6 Fluidisation

Type designation

The type plate bears a type designation, such as for instance PTA-300/D, PTA-2300/KG1 or PTA80/K. PTA/DS/D (double blow vessel with butterfly valve):

PTA	=	pneumatic dense-phase conveyor (pulse-cycle type)
-300	=	gross volume of the pressure vessel (blow vessel) in litres
D	=	blow vessel closing device (butterfly valve)
KG1	=	calotte-type closing device, specially suited for the conveyance of granules (plus size indication)
K	=	calotte-type closing device
DS	=	double blow vessel

(see corresponding additional information in the separate operating instructions)

4.2 OPERATING PRINCIPLE

The system (picture 1) is operated intermittently. The blow vessel is exhausted via the exhaust air valve and subsequently filled via the blow vessel closing device (a) (standard equipment: butterfly valve; optional equipment: calotte-type closing device or calotte-type closing device which is specially suited for use with granules). The air in the blowing vessel is, during this procedure, primarily displaced via the exhaust valve (b) and, partially, via the blow vessel closing device. After completion of the filling procedure and the closure of the blow vessel closing device, overpressurised conveying air is, in order to start the transport of the bulk material to be conveyed, admitted rhythmically at the top of the blow vessel in an alternating manner (top air, c) and at the bottom into the pulsator (bottom air, d) that is installed downstream the blow vessel outlet (pulse cycle operation). The top air generates the required counter-pressure and presses the solid material to be conveyed into the conveying pipe, thereby forming a so-called slug. The bottom air (pulsator) causes the formation of an air cushion based on which the solid materials is being conveyed through the conveying pipe in the form of a slug. The loading of these slugs, i.e. the solid material volume per conveying air volume, is determined through the different top- and bottom air phase times. These phase times can be adjusted at the control system (STP-51, for ex.) which also controls all other operating sequences of the conveyor (when using the control system STP-51 for example, please refer to the corresponding operating instructions established for it). As soon as the overall solids were conveyed out of the blow vessel, the air in the blow vessel is exhausted and a new filling procedure starts running.

PulseLine activators (option):

The PulseLine activators are added on or activated in dependence on the pressure situation in the conveying line. They serve to admit, in a pulsating manner, additional air wherever this is necessary inside the conveying line.

4.3 BLOW VESSEL

The pressure vessel used as for blow vessel is a quality tested device. It takes - via the blow vessel closing device - the bulk material in that needs to be conveyed. After that, the blow vessel is, through the air admitted to it, being put under pressure until to the moment the bulk material to be conveyed is pneumatically pressed into the conveying line (infeed). During this procedure, the conveying air is admitted in an alternating manner (i.e. in phases) either as top- or as pulsator or so-called bottom air. The pressure vessel must, in as far as its quality is

concerned, comply with the relevant local regulations and prescriptions enacted with regard thereto. The gross volume as well as the maximum admissible operating excess pressure and operating temperature is indicated on the type plate affixed on the blow vessel. The available volume depends on the bulk material actually to be conveyed (dependent on the angle of repose). For further details with regard thereto, please refer to the additionally enclosed GERICKE system data sheet. The prevailing operating pressure can be read off the contact pressure gauge installed in the top air supply line.

4.3.1 BLOW VESSEL CLOSING DEVICE (ON THE INLET SIDE)

The blow vessel closing device closes the blow vessel in a pressure resistant manner and, if in opened condition, enables the filling of the vessel.

As for standard, GERICKE offers the following closing device types:

Butterfly valve "D": universally applicable

- Calotte-type closing device "KG" (specially suited for the conveyance of granules):

Can close in a pressure-tight manner while the granular material to be conveyed is flowing and can also close pressure-tight in the event of a material pile-up. With this closing device, the maximum admissible size of the particles conveyed depends on the construction size of the machine.

For the blow vessel closing device used with your system, please refer to the system data sheet and the sub-chapter 3, "SCOPE OF DELIVERY" herein as well as to the separately established operating instructions. To meet with the requirements in special cases, cut-off slides, slide valves, ball valves and mechanical pinch valves are available in addition.



Danger

The blow vessel closing device (feed orifice) must under no circumstances be opened as long as the blow vessel is still under pressure, neither in manual nor in automatic mode! The safety contact P1 on the contact pressure gauge must, for this reason, always be adjusted to a value close to zero (i.e. 0.1 to 0.2 bar). The software used by the electronic control system (STP-51, for ex.) has been optimised for the control of this type of closing device. However, the control of the closing device **is deactivated** when opening it by way of manual emergency actuation (solenoid valve Y 1.2).

4.3.2 EXHAUST VALVE / AIR EXTRACTION CONDUIT

Care must be taken to ensure that the air extraction conduit (connection between exhaust valve and dedusting facility) must, in order to ensure that bulk material residues can flow back into the blow vessel, not be laid horizontally (risk of clogging). The complete venting installation must periodically be checked for proper passage and correct functioning.



Danger

When operating in manual mode, the exhaust valve may, once the blow vessel is still under pressure, only be opened cautiously, scilicet by admitting short pulses (risk of bursting of the dedusting facility)!

When filling / feeding the blow vessel with well fluidizable or erratically flowing products, the complete blow inlet assembly (i.e. exhaust valve, safety valve and contact pressure gauge) must be displaced slightly by approx. 80 cm in vertical or upward direction.

4.3.2.1 DEDUSTING FACILITY REQUIRED FOR BLOW VESSEL VENTING (OPTION)

When filling or feeding solids into the blow vessel, air and whirled up solids are being displaced through the exhaust valve. These solids need to be separated from the gas flow. This may either happen in a central aspiration unit with separation facility or in a filter that is subject to mechanical or compressed air cleaning.

The exhaust conduit (connection between the venting system and the dedusting facility) must, in order prevent from clogging up and in order to ensure that probably existing solid residues are able to flow back into the blow vessel, **not** be laid horizontally.

The cross section of the exhaust conduit must, in order to prevent from too high blow speeds, be as big as possible (analogous to the nominal width of the exhaust valve).



Danger

The complete venting system must periodically be checked for proper passage and functioning. The exhaust valve must, once the blow vessel is under pressure (which may be the case in the event of a clogged up conveying line), only be opened cautiously by admitting short pulses (risk of bursting of the dedusting facility). In the event the blow vessel is filled / fed with well fluidizable or erratically flowing products, the exhaust valve needs to be displaced by approx. 80 cm in vertical direction.

4.3.3 SIGNALLING PROBE "LEVEL HIGH" (LH)

The machine is delivered accompanied by separate operating instructions concerning this probe. The probe emits a signal to the superordinated control system (STP-51, for ex.) once the blow vessel is filled. After that, the filling / feeding procedure is terminated and the blow vessel closing device (intake) closed.

With smaller blow vessels in particular, the application of a "level high" signalling probe can be dispensed with, as, in these cases, the product feed operation is controlled by a timer. The timer-controlled operation of the device, however, is less comfortable than the "level high" signalling probe supported one.

4.3.4 SIGNALLING PROBE "LEVEL LOW" (LL) (OPTION)

The machine is also delivered accompanied by separate operating instructions concerning this probe. The probe emits a signal to the superordinated control system (STP-51, for ex.) once the blow vessel reaches the probe level while being discharged. After that, the pre-adjustable subsequent conveying time starts running. Once this time is over, the system is relieved until to the point where, upon the lower deviation of pressure switch level P2, the venting of the blow vessel is activated. Normally, the pressure switch P2 is adjusted to a value that is equivalent to 50 % of the conveying pressure. These setting options enable to operate in an operation mode where the conveying pipe, depending on the actually adjusted subsequent conveying time, is not discharged completely. The material to be conveyed is thus treated more gently.

4.3.5 OUTLET VALVE (OPTION)

The outlet valve is fitted shortly after the blow vessel and prevents the feeding of product into the conveying line while the blow vessel filling procedure is in progress. Outlet valves need to be used with well fluidizable and erratically flowing products. This applies to all cases where the bulk material is not supplied to the blow vessel in a metered manner, scilicet all cases where the blow vessel is mounted directly underneath of a silo that doesn't dispose of a product metering facility. The use of outlet valves is likewise recommendable in all cases where big volumes need to be conveyed. If need be, the outlet valve enables the unclogging of the pipe. With all PTA dense-phase conveyors that dispose of a declogging installation, the outlet valve is included in the scope of the delivery.

4.4 SAFETY DEVICES

4.4.1 SAFETY VALVE



Danger

The safety valve is a mechanical, spring-loaded element that protects the blow vessel against too important pressure loads. Once an excessive load is detected, the valve opens and exhaust air along with perhaps some product escapes into the environment. In the event this was inadmissible or even dangerous, the exhaust air needs to be collected accordingly (option). The safety valve must be serviced and controlled regularly.

4.4.2 SAFETY PRESSURE SWITCH (P1) "SAFETY"

When operating in manual or in automatic mode, the safety pressure switch prevents the opening of the blow vessel closing device (intake) as long as the pressure adjusted at the pressure switch contact is transcended, i.e. as long as the blow vessel is under pressure. This contact needs to be adjusted near to zero (excess pressure of 0.1 to 0.2 bar), so that, with the blow vessel in off-position, the previously adjusted pressure level is only just underrun. The cabling must be realised in a cable break-proof manner (break contact).

4.4.3 SAFETY PRESSURE SWITCH (P2) "CONVEYING"

The pressure level to be adjusted at this switch must be by 0.3 to 0.5 bar below the actual conveying pressure level. Actuated by this pressure, the contact P2 serves to maintain the ongoing conveying procedure. Once the previously defined pressure level is being underrun during the conveying procedure (i.e. in the event the blow vessel is empty), the pressure switch triggers the subsequent conveying cycle. The duration of the subsequent conveying cycle is adjusted by means of a timer (see separate operating instructions established for the control system (STP-51, for ex.)). Small blow vessels in particular, can also be operated time-controlled only. This, however, also goes along with a loss of comfort. As for "level low" probe equipped systems, please refer to sub-section 4.3.4 herein.

4.4.4 PRESSURE SWITCH (P3) "EXCESS PRESSURE" (OPTION)

Once the pressure level adjusted at this switch is underrun, the system is disconnected and made voltage-free and a corresponding fault message on the display of the control system. The cabling has be carried out in a wire break-proof manner (break contact).

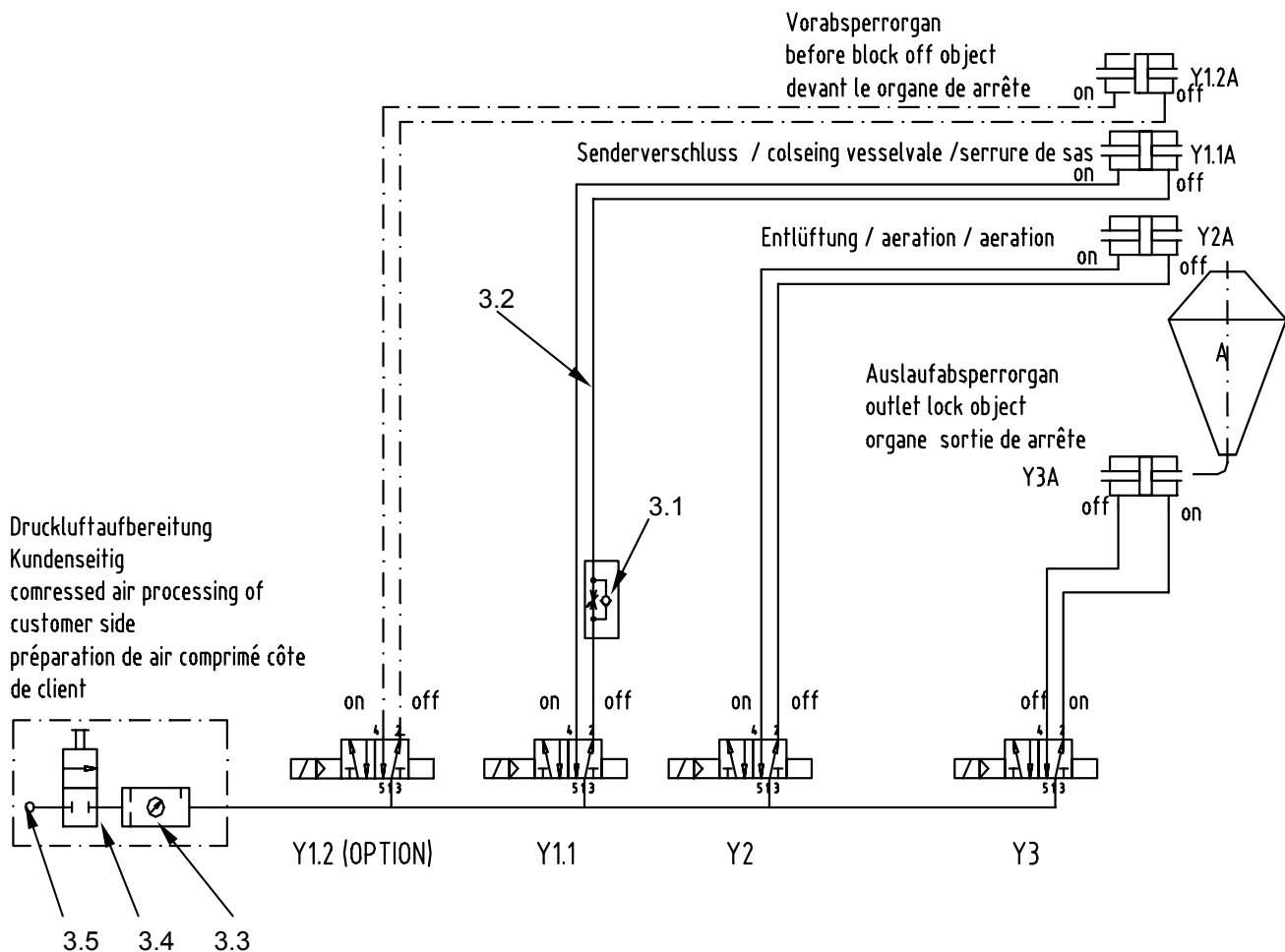


Danger

Caution! The system is still under pressure and contains product!
Prior to performing any activities, the system needs to be exhausted manually in a circumspect manner (see manual operating mode).

4.5 CONTROL AIR UNIT

Arranged on a base plate mounted on the blow vessel, there exist up to four solenoid valves that serve for the control of the blow vessel closing device, of the exhaust valve, the blow vessel outlet (option) and the cut-off locking organ (option), see illustration 1.



- Y1.15/2 – way – solenoid valve (blow vessel closing device)
- Y1.25/2 – way – solenoid valve (cut-off locking organ, option)
- Y2 5/2 – way – solenoid valve (blow vessel venting)
- Y3 5/2 – way – solenoid valve (blow vessel outlet, option)

- 3.1 One-way restrictor for speed regulation
- 3.2 Hoses, screwed connections and threaded joints (supplied loose)
- 3.3 Servicing unit (customer supplied)
- 3.4 Stop cock (customer supplied)
- 3.5 Control air network (customer supplied)

Standard valves: ISO 1 solenoid valve
Y1.1, Y2, (Y3)

Power consumption: 2.5 Watt (at 24 V)
3.7 Watt (at 110 V)
3.7 Watt (at 230 V)

Piloted by the electronic control system, those solenoid valves are actuated which enable the pneumatic activation of the peripheral equipment.

The solenoid valve Y1.1 serves for the control of the blow vessel locking device.

The solenoid valve Y 1.2. serves for the control of an optionally existing cut-off locking organ.

The solenoid valve Y2 serves for the control of the exhaust valve.

The solenoid valve Y3 serves for the control of an optionally existing outlet valve.

As for standard, the coils of the 5/2-way-solenoid valves have been dimensioned for 24 V DC operation.

With double blow vessels, the valve groups can be integrated into one unit (designated by the indexes A or B).

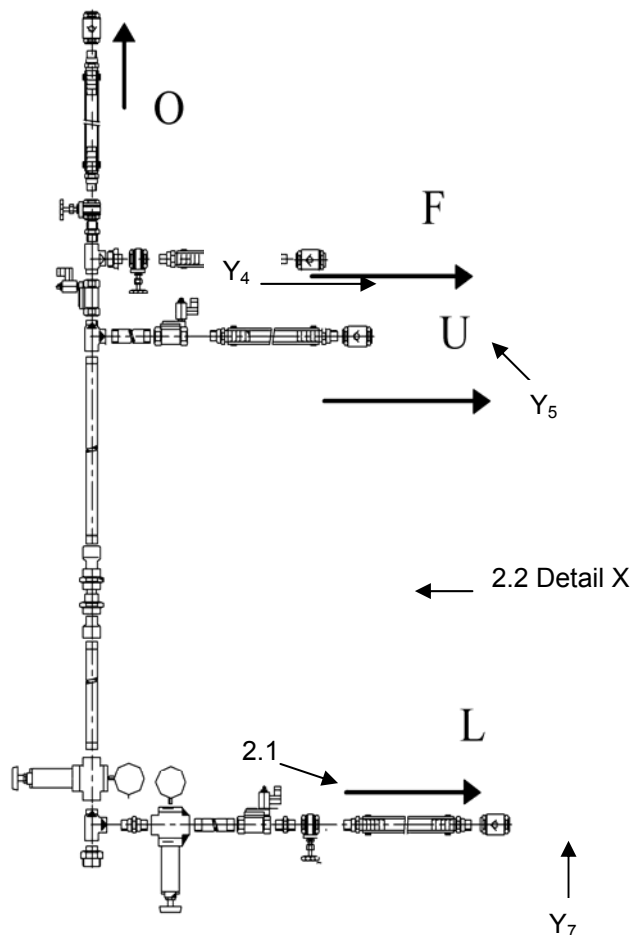
4.6 CONVEYING AIR FITTINGS UNIT

The conveying air fittings unit in this unit serve to supply certain conveying air volume that is defined in compliance with the Laval nozzle inlet pressure and the nozzle actually installed to the top- and to the bottom air supply system. The corresponding cycle time can be adjusted at the superordinated control system (STP-51, for ex.). Modules for purging and/or fluidization purposes can be attached to this fittings unit in addition.

This fittings unit is delivered as an assembly group (including all connecting hoses to the blow vessel) and must be mounted in unchanged condition. The maximum admissible hose length is 5 meters. As for standard, the nominal operating voltage of the solenoid valves is 24 V DC.

Legend:

- O Top air
- F Fluidization (option)
- U Bottom air
- L Purging or declogging (in the event an outlet valve is mounted; options)



- Y4 2/2-way-solenoid valve (top air)
- Y5 2/2-way-solenoid valve (additional air supply for fluidization)
- Y7 2/2-way-solenoid valve (additional bottom air)

- 2.1 Inlet pressure regulator for Laval nozzle (air volume metering)
- 2.2 Laval nozzle

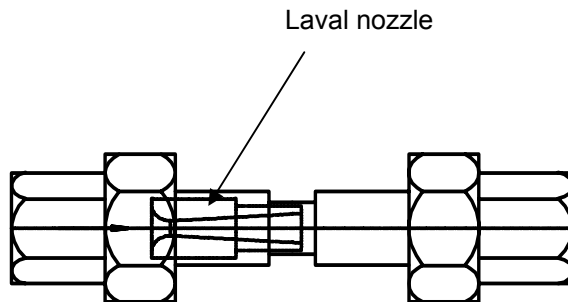
* Standard valves: solenoid valve (ISO), indirectly actuated type.

Power consumption:	at 24 V	2.5 Watt
	at 110 V	3.7 Watt
	at 220 V	3.7 Watt

Always make sure to equip all coils with special damping elements (extinction of sparks).

Maximum length of the hose between the fittings unit and the blow vessel in each case: 5.0 m.

Detail X (Laval nozzle)



4.6.1 ATTACHED PURGING COMPONENTS (OPTION)

These components, if attached, enable to purge the system, e.g. when changing the product to be conveyed, in the case of longer stop times or in the event the blow vessel is weighed in order to check the actual material flow.

4.6.2 ATTACHED DECLOGGING COMPONENTS (OPTION)

These components, if attached, enable the declogging of the conveying pipe, i.e. if the material in the pipe clogs up by reason of unoptimal settings or changed product characteristics. The declogging is possible only with the conveying program in stopped condition.

4.6.3 COMPONENTS FOR THE GENERATION OF FLUIDIZATION AIR (OPTION)

These components enable to fluidize the product in the outlet area, which in turn can influence the product charging operations.

4.7 CONVEYING PIPE (OPTION)

The conveying pipe serves for the transport of the bulk material from the blow vessel to one or several receivers. The dimensioning and gradation of the conveying line can be learned from the GERICKE system data sheet. Even if the conveying pipe does not form part of the scope of the delivery of the GERICKE dense-phase conveyor described herein, it is nevertheless an essential system constituent, the correct dimensioning and assembly of which is decisive with regard to a troublefree operation of the overall system:

Concerning the provision of the conveying line, 3 options are possible:

- a) Supply by the customer
- b) Supply by GERICKE
- c) Utilisation of an already existing conveying pipe

When utilising an already existing conveying pipe, however, the pipe must be recalculated by GERICKE or be re-dimensioned accordingly in order to obtain the best possible conveying performances.

To enable this, the customer must provide GERICKE by all means with an alluring **ISOMETRY!**

This isometry must contain the following additional information:

- Desired or existing pipe dimensions (outside diameter x wall thickness), material;
- Position of possibly existing pipe extensions;
- Size of connecting pieces that possibly exist at the receiver vessels;
- Position and inside diameter of already existing or desired sight or inspection glasses;
- Position, type, make and inside diameter of already existing or desired pipe diverters;
- In the event the new GERICKE system is intended for the replacement of an existing system, all eventual difficulties or problems encountered with the old system must be communicated to GERICKE.

As of certain conveying pressures, the conveying pipe needs, in order to keep the air velocities within bounds, to be extended periodically in backward direction. In the event the customer places an order with regard thereto, GERICKE will take charge of the calculation of these gradations. In the event the customer himself undertakes to supply the conveying pipe, the customer must wait with the ordering of further system parts and components until the definitive calculation with regard to the conveying pipe is on hand.

4.7.1 PRESSURE STRENGTH

The components actually applied must be able to withstand the maximum possible blow vessel pressure (triggering pressure of the blow vessel safety valve).

Recommendation: at least PN-6

The utilisation of pipe diverters at the end of the conveying pipe is admissible if the internal density of the diverters comes to 0.5 bar. However, the enclosure of the pipe diverter must, in extreme cases, be able to absorb the triggering pressure of the blow vessel safety valve!

4.7.2 INTERNAL PROTRUSIONS AT THE PIPE TRANSITIONS

Negative protrusions (i.e. protrusions seen in conveying direction), must, in relation to the corresponding pipe diameters, not exceed the following sizes:

DN 50	0.5 mm
DN 65, DN 80	1.0 mm
DN 100 - DN 150	1.5 mm
DN 200	2.0 mm

Unavoidable protrusions must, in general, be chamfered flush with the pipe. Turbulences can thus be avoided. The inside diameter of the conveying line must be adjusted to the actually applied system components (pipe diverters, sight or inspection glasses, flexible hose connections, etc.).

4.7.3 STRAIGHT PIPE SECTIONS

The following materials are suited for this purpose:

Normal steel pipes (smoke pipes, smooth at the inside, precision steel tube).

Wall thicknesses in mm						
	DN-50,65	DN-80	DN-100	DN-125	DN-150	DN-200
Normal:	2-3	2.5-3.5	3-4	3-4	3.5-5	4-6
Abrasive products	4-5	4-6	4-7	5-7	5-7	6-8

Stainless steel pipes (longitudinally welded or seamless, smooth at the inside).

Wall thicknesses in mm						
	DN-50,65	DN-80	DN-100	DN-125	DN-150	DN-200
Normal:	1-3	2-3	2-3	2-4	3-4	3-5
Abrasive products	2.9-3.2	3-4	3-4	4-5	4-6	4-6

Plastic pipes (antistatic) for the conveyance of aggressive or scale forming products. Materials and wall thicknesses to be adapted to the individual case.

Hoses (antistatic) for adhesive or fat containing products. Materials and wall thicknesses need to be adjusted to the individual case of application. With hoses with an invulcanized steel wire spiral the self-cleaning effect is usually more worse than with spiral-free hoses.

4.7.4 DEFLECTION BENDS

The following bends are suited for deflection:

Steel pipe bends (materials and wall thicknesses as described in the section hereinbefore).

Plastic pipe bends, hose bends, any type of wear bends, flow diverters.

With scale forming products, a combination of straight steel pipe segments and hose diverters will often lead to success, since the tendency to form scales is often to be observed in pipe bends only.

Mean radius Rm (mm) of pipe bends:	
DN-50; 65	600 – 800
DN-80,100	800 – 1000
DN-125,150	1000 - 1200
DN-200	1200 – 1500

4.7.5 PIPE CONNECTIONS

Usually, smooth flanges suit best for the realisation of pipe connections. With pipes of large nominal widths or heavy, thick-walled pipes the use of centering shoulder equipped flanges is recommended in order to ensure an offset-free installation. Regarding gaskets or seals, types made of Klingerit or similar material only should be used if ever possible to ensure that the gasket cannot get into the pipeline when tightening the connections.

With rubber gaskets, the use of types the shore hardnesses if which is $< 60^\circ$, is prohibited. If using rubbers gaskets, special qualities with a fabric insert need to be employed. The inside diameter of the gasket must, at least, be 7.0 mm bigger than the nominal inside diameter of the related pipe.

Clamping joints or quick release couplings are, provided however they are able to absorb the axial and pulse forces called into being through the existing internal pressure, admissible.

4.7.6 SIGHT AND INSPECTION GLASSES

Sight and inspection glasses may be used only if they dispose of an appropriate splinter protection. Usually, sight and inspection glasses of limited inside diameters are available on the market (mostly 1 size per DN only). In consequence of that the inside diameter of the related pipe must be adjusted to the glasses in such manner that no excessive narrowing of the cross-section comes into being (see section 4.7.2., "INTERNAL PROTRUSIONS AT THE PIPE TRANSITIONS"). **CAUTION:** There are no antistatic sight or inspection glasses available. This is why it is always to be reckoned with sparking in consequence of the electrostatic charging.

4.7.7 PIPE DIVERTERS

Regarding pipe diverters, the use of types is admitted only that, according the following list, do not, if seen in conveying direction, cause any excessive narrowing of the pipe cross-section. Regarding the pressure requirements to be met, please refer to section 4.7.1 "PRESSURE STRENGTH" herein.

The following diverter construction types can be applied:

- Drum diverters
- Tongue diverters
- Pinch valve diverters (with abrasive products or product temperatures > 50°C mechanically operated pinch valves to be used).
- Ball valve diverters
- Hose diverters, slide diverters
- Hose- or rotary diverters

4.7.8 EARTHING

When conveying dust explosive or other potentially explosive products or when operating in an explosive environment, all pipe connections need to be provided with stranded earthing wires. The conveying pipe ends as well as the blow vessel need all be connected to earth potential.

4.7.9 ACTIVATORS (OPTION)

With longer conveying lines (of usually more than 80 m length), activators are installed as additional conveying and/or declogging components. Conveying gas is injected all along the conveying line. With products of more difficult conveying characteristics, it is recommendable to install activators even with shorter lines. Regarding the determination of the position, number and size of the activators, please refer to the related GERICKE system data sheet. The activators can either be operated manually by means of manually operated valves or electro-pneumatically via the superordinated control system (STP-51, for ex.).

4.7.10 PULSLINE ACTIVATORS

The PulseLine activators are controlled based on measuring results and need to be attached to the conveying pipe as specified on the corresponding isometry sheet. Regarding the construction and design of the PulseLine activators please refer to the enclosed drawing "Prinzip PulseLine Gruppe" (PulseLine activator group, operating principle).

4.7.11 INJECTION INTO THE RECEIVER VESSEL

Tangential injection: Causes the production of rather high volumes of dust and dust deposits on the walls inside the receiver vessel.

Injection in vertically downward direction: Care must be taken with this injection method to ensure that the nominal diameter of the pipe bend that unites the horizontal and the vertical axes and the nominal diameter of the vertical pipe segment that leads to the receiver vessel is, preferably, by one size larger than the nominal diameter of the conveying pipe. The inlet speed will thus be reduced.

"Silo terminals" (flow diverter with strongly enlarged outlet): "Silo terminals" are excellently suited in order to deaden the speed energy of the bulk material actually conveyed.

Radial injection: Although this injection method is very product sparing, it can only be applied with very big silos. If otherwise, the product would be projected against the silo wall. When using this method, care must be taken to ensure that circa the last 3.0 m of the conveying pipe are widened by one nominal width size in order to reduce the product inlet speed.

When in doubt, please do not hesitate to consult us for check back.

4.7.12 CONVEYING AIR DEDUSTING FACILITIES (OPTION)

Both the conveying air and the product are separated at the end of the conveying distance. Normally, the conveying air needs still to be dedusted. Usually, automatic filters are used for this purpose. If the filter is not included in the scope of the delivery, the required filter can be dimensioned on the basis of the specifications on the system data sheet.

4.7.13 PRESSURE RELIEF FLAP



Danger

Pressure relief flaps are mechanically operated excess pressure protection devices (burst protection) that serve to prevent dedusting facilities and silos from bursting. **The provision of pressure relief flaps by the operator is compulsory!** When conveying dangerous products, the operator must, in the course of a safety analysis, verify if or if not the product escaping from the system in the event of a reaction of these pressure relief flaps can be collected.

4.8 OPERATING CONDITIONS

A specification of the operating conditions to be observed with regard to the pressure and temperature levels admitted with the supplied system can be learned from an additional plate affixed on the blow vessel. GERICKE guarantees a conveyance only with regard to the products based on the characteristics of which the dense-phase conveyor described herein has been dimensioned and designed (see system specifications). Any modification or change of the product to be conveyed and also any change of the conveying path or distance to be covered, requires that a new verification of the machine dimensioning be made.

Without special confirmation, the following temperature levels are assumed to be correct:

- Maximum product temperature: 80° C
- Maximum ambient temperature: 40° C

4.9 EXTERNAL FIRE



Danger

Always make sure to avoid the existence of combustible materials in the vicinity of the system, as these could lead to or cause an external fire.

5 ASSEMBLY AND INSTALLATION

5.1 TO BE PROVIDED BY THE OPERATOR OF THE SYSTEM

5.1.1 COMPRESSED AIR

A specification of the required compressed air supply can be learned from the system data sheet. The compressed air needs to be free from water and oil. A specification of the pipe fitting dimensions too is indicated on the system data sheet.

5.1.2 CONTROL AIR CONDITIONING

The control air must only be supplied into the corresponding valves after its compression to an excess pressure level of 5 to 6 bar. The conditioning unit needed for this (customer supplied) includes a water separator, a pressure regulator and an oiler.

The control overpressure required for the actuation of the directly operated pinch valves that exist at the blow vessel needs to be adjusted by means of **a separate pressure regulator** that has to be **provided by the customer**. Depending on the pressure level that prevails inside the pinch valve, a pressure level of 2 to 4 bar will suffice. In order to attain a best possible lifetime of the sleeve, the adjustment of the minimum required pressure level should be aimed for.

The control air requires no oiling, although oiling would contribute to increase the serviceable life of the solenoid valves and the mechanical actuators and control elements. When using directly operated pinch valves, no oil should be added (risk of an ingress of oil into the product in the event of a breakage of the sleeve).

Size required for the connection of the control air: ½ Inch, at the minimum

Control air stop cock:

The stop cock enables to stop the supply of control air in the event of maintenance works.

5.1.3 PRESSURE RELIEF FLAP

This flap serves for mechanical excess pressure protection (burst protection) purposes and is used to protect dedusting facilities and silos against bursting. Pressure relief flaps need - for security reasons - to be provided by all means.

5.1.4 SILOS AND CONTAINERS MOUNTED ABOVE THE BLOW VESSEL



Danger

In this event, the utilisation of a cut-off locking organ is of advantage. In the event a hopper type discharge vibrator without cut-off locking organ is used, the sleeve used for the connection between the discharge vibrator and the blow vessel can burst on account of the leakage flow that can be called into being in the event of the blow vessel locking device is leaky. The hopper content would be discharged down onto the floor. This can be avoided when installing a small, exhaust line equipped buffer hopper above the blow vessel.

5.2 CONTROL OF THE DELIVERY

The machine is delivered pre-assembled in different groups. Prior to the installation of machine, the delivery should be checked for the following:

- Completeness, including operating instructions (see order confirmation and chapter 3, "SCOPE OF DELIVERY");
- Transport damages;
- Correct type designation (see order confirmation);
- Supply voltage of the electrical equipment;
- The pressure required for the connection of the control- and conveying air supplies.

5.3 TRANSPORT AND INSTALLATION



Always make sure to dispose of the appropriate ropes and ribbons, when transporting the blow vessel by means of a lifting machine or device!

The installation, mounting and assembly of the machine may be performed by trained personnel only! Prior to performing any such works, these operating instructions must have been read completely. When doing so, all safety information contained therein should be made a matter of particular attention.

5.3.1 INSTALLATION, MOUNTING AND ASSEMBLY

Regarding the mounting and assembly of the machine, the following order of steps needs to be followed (corresponding assembly platforms to be provided by the customer, if need be):

- Deployment of the blow vessel (both the hand hole and the level detectors need to be accessible). The blow vessel must be fastened in a tilt-proof manner.
- Mounting of the outlet assembly of the blow vessel including outlet bend, outlet valve (if included in the scope of the delivery) and of the pulsator.
- Conveying pipe: as for the pipe dimensions and line extensions, please refer to the isometry and the system data sheet). The conveying pipe must, in order to be able to absorb the occurring pulse forces, be fastened in a solid and stable manner. All relevant parts need to be accessed easily in order to enable a perfect maintenance.
- Installation of the exhaust line.
- Installation of the conveying air fittings (maximum length of the hose up to the blow vessel: 5 m). The fittings unit must not be changed when mounting it.
- Installation of the control air supply line going from the locking organ up to the solenoid valve bank and from there to the consumers (blow vessel closing device, venting system, exhaust valve, cut-off locking organ).
- Installation of the electronic control system in compliance with the separately furnished operating instructions. The control system must to be installed in an easily accessible manner and need to be well visible (depending on the case, installation of an external emergency off facility required).
- Electric cabling works (to be performed by trained personnel only).
- Earthing of the corresponding system parts.
- Control of all actually installed mechanical and/or electrical parts, elements and components.

6 COMMISSIONING



Prior to the commissioning of the machine described herein, these operating instructions have to be read thoroughly. To ensure a smooth commissioning, we recommend to ask for our experts who will take charge of the instruction of the operator's staff. An instruction through our responsible experts ensures a far more efficient instruction of the operator's staff, cuts down on the time otherwise spent for the commissioning of the machine and provides the safety of the correct recording of all settings and adjustments made on the machine.

6.1 COMMISSIONING WITHOUT PRODUCT



Danger

Prior to the activation of the control system, all electrical connections need to be checked for their professional realisation (i.e. control of all voltages and current types of all elements and components including the control system for correctness and compliance with the specifications).

- Check of all safety devices (emergency off facilities).
- Programming of the control parameters (see corresponding operating instructions).
- Adjustment of the control air pressure by means of reducing valve (customer supplied) to the required control valve pressure level (solenoid valves 5 to 6 bar, pinch valves 2 to 4 bar).

6.2 CONTROL OF INDIVIDUAL COMPONENTS

6.2.1 BLOW VESSEL CLOSING DEVICE

- **Blow vessel closing device (butterfly valve)**
Adjustment of the flap disc closing angle by means of the two adjusting screws that exist at the rotary cylinder (see also separately furnished instructions). The flap must open smoothly, but still close in an absolutely tight manner (see operating instructions established for the butterfly valve). After that, adjustment of the valve opening speed via the one-way restrictor in such manner, that the flap will open after 2 to 3 seconds. Adjustment of the limit switches (if included in the scope of the delivery).
- **Calotte-type closing device KG** (specially suited for the conveyance of granules) or **Calotte-type closing device K**:
(see also the related instructions): Adjustment of the final position damping and of the control speed via the one-way restrictor:
KG: 1 to 2 seconds up to complete opening and 3 to 4 seconds for closing.
Adjustment of the limit switches (if included in the scope of the delivery).
K: 1 to 2 seconds up to complete opening and 2 to 3 seconds for closing.
Adjustment of the limit switches (if included in the scope of the delivery).

6.2.2 CONTACT PRESSURE GAUGE

Operational check of the contacts P1 / P2 / P3.

6.2.3 SIGNALLING PROBE "LEVEL HIGH" (LH)

Setting of the probe in compliance with the data specified in the separate operating instructions.

6.2.4 SIGNALLING PROBE "LEVEL LOW" (LL)

Setting of the probe in compliance with the data specified in the separate operating instructions.

6.2.5 CONVEYING AIR

Adjustment of the required Laval nozzle inlet pressure. Regarding the required air volume, please refer to the GERICKE system data sheet (Q_L mom).

6.2.6 OUTLET VALVE

Operational check: "opening / closing"

6.2.7 EXHAUST VALVE

Operational check "opening / closing".

6.3 OPERATIONAL CHECK IN MANUAL MODE

Actuation of individual elements!

The blow vessel needs to be checked for tightness. To enable this, the outlet valve (if existing) needs to be closed first or, if otherwise, a blind flange be installed between the conveying pipe and the pulsator.

- First admit blow vessel air until to a maximum pressure level of 1 bar. The pressure must not fall after the deactivation of the blow vessel air supply.
- After that, increase the blow vessel pressure until the safety valve reacts. After the reaction of the safety valve, the air supply is deactivated. Once the safety valve closes again, the blow vessel pressure must not drop any further.
- Then exhaust the blow vessel cautiously in a pulse-wise manner.

6.4 TEST RUN IN MANUAL MODE (WITH PRODUCT)

Regarding the adjustment of the values specified herein below, please refer to the operating instructions established for the control system (STP-51, for ex., section 6.3).

Regarding the control of the blow vessel air and bottom air (pulsator) operation cycle, only a first recommendation can be given here. The ideal values strongly depend on the type of the bulk material actually to be conveyed and on the conveying distance to be covered.

The timer "blow vessel air ON" determines the duration of the top air supply and thus also the length of the product slug that gets into the conveying pipe. Usually, long product slugs produce higher pressures than short slugs. With shorter slugs, the conveyance procedure is actually more gentle. The timer "bottom air ON" determines the duration of the bottom air flow and thus the length of the air cushion between the individual product slugs.

If using PulseLine activators (option), the configuration and parameterisation of the activators must be made in compliance with the specifications contained in the operating instructions established for the control system.

Regarding the commissioning, the following standard values do apply:

Standard value	Conveying distance 25 m	50 m	150 m	200 m
Timer "Blow vessel air ON"	1.5 s	1.2 s	1.0	1.0
Timer "Bottom air ON"	1.5 s	2.0 s	3.0	6.0

Once the conveying pressure is too low or the conveying performance too weak, the timer "blow vessel air ON" needs to be set to a higher time value and the timer "bottom air ON" to a smaller one. Once the conveying pressure is too high or the system clogged up, the time value at the timer "blow vessel air ON" needs to be reduced and one at the timer "bottom air ON" be increased.

Regarding the air speed at the end of the conveying line, the following standard values do apply:

- Extremely slow conveyance 4 - 8 m/s
- Slow conveyance 6 - 10 m/s
- Dense-phase conveying without special requirements 7 - 20 m/s

These data apply to small and medium conveying pipe diameters and a conveying distance of 100 m length. The bigger the nominal width of the pipe, the stronger the air speed needed for proper conveying. The product speed is equivalent to approx. 50 % of the air speed (standard value).

6.5 TEST RUN IN AUTOMATIC MODE (WITH PRODUCT)

The loading, i.e. the air quantity per transported solid quantity can be changed through the corresponding adjustment of the "blow vessel air" and "bottom air" cycle times, which in turn enables to adjust the desired product quantity to be conveyed. Contingently, the conveying air volume too needs to be changed via the Laval nozzle inlet pressure (to be adjusted while blowing). Caution: The difference between inlet- and conveying pressure must come to approx. 20 %. The calculated performance data are attained through the optimisation of the air quantity and of the relevant timers.

6.6 PURGING (OPTION, SEE 4.6.1) IN MANUAL MODE

The conveying pipe can be purged only with the conveying program in stopped condition. The purging operation can be activated via the control system, see separately furnished operating instructions generated for control system (STP-51, for ex., section 6.4.4).

6.7 DECLOGGING (OPTION, SEE 4.6.2) IN MANUAL MODE

Declogging is needed only in case the conveying line is clogged up by reason of nonoptimal settings or changed product characteristics. Declogging is possible only in manual mode and only with the conveying program in stopped condition. The declogging operation can be activated via the control system, see separately furnished operating instructions generated for control system (STP-51, for ex., section 6.4.3).

Line of action to be taken after the occurrence of an obstruction:

- Vent and exhaust the system cautiously pulse-wise (risk of bursting of the dedusting facility)
- Once the system is unpressurized, open the exhaust valve.
- Close the outlet valve.
- Use the bottom air (pulsator) to set the conveying pipe under pressure (**must not be any higher than the admissible operating pressure of the blow vessel!**). The pipe is under pressure if no blow noises are to be heard anymore in the conveying air fittings or if the inlet pressure regulator does no longer indicate a pressure loss (manometer readout).
- Deactivate the bottom air (pulsator).
- Open the outlet valve. Bulk material flows back into the blow vessel. Air escapes through the exhaust valve.
- Repeat this procedure until the conveying pipe is completely declogged and again ready for normal operation.

7 SERVICING AND MAINTENANCE INTERVALS

A GERICKE PTA dense-phase conveyor (pulse-cycle type) has only a few moved parts and is thus very easy to maintain.

7.1 WEAR PARTS

- Sleeves of directly operated diaphragm pinch valves (outlet valve, exhaust valve)
- 2/2-way-diaphragm valve installed in the blow vessel- and pulsator air systems (diaphragm in particular)
- Activators and PulseLine activators
- Sealing diaphragm of the diaphragm valve used for venting
- Sleeves of mechanically operated pinch valves

7.2 PARTS SUBJECT TO PARTIAL WEAR

- Sealing collars of butterfly valves (at the blow vessel closing device, the outlet and the fittings)
- Shafts and calottes as well as plain bearing bushes and V-rings of the calotte-type closing device K and the calotte-type closing device KG (special type for use with granules)
- Ball seals of ball valves
- Pulsator during the conveyance of abrasive products
- Blow vessel outlet bend
- Non-return valves and pressure regulators

7.3 MAINTENANCE WORKS TO BE PERFORMED EVERY TIME AFTER 100 SERVICE HOURS

- Check of all safety devices
- Check of all wear parts (see sub-section 7.1)
- Check of the blow vessel venting system (must not be filled with product or be clogged)
- Refilling of the oil mist devices in the control air system (if existing)
- Emptying of the water separators
- Control of the blow vessel safety valve for internal dirtying through product or dust
- Control of the system incl. the conveying pipe for the escape of dust and eventually loose screwed or bolted connections or loose hose clips
- Check of the system settings and comparison with the values recorder during commissioning. All changes attributable to operational reasons to be protocolled!
- Control measurement of the conveying performance
- Control of the setting of the contact P1 (safety) at contact pressure gauge
- Control of the setting of the contact P2 (conveying) at the contact pressure gauge
- Control of the setting of the contact P3 (excess pressure) at the contact pressure gauge
- Check of all earthing connections
- With PulseLine activators (option): check of the pressure transmitter via status indication on the control display

7.4 MAINTENANCE WORKS TO BE PERFORMED EVERY TIME AFTER 650 SERVICE HOURS

- Check of all parts that are subject to partial wear (see sub-section 7.1).
- Check for tightness as describe in sub-section 6.3, "OPERATIONAL CHECK IN MANUAL MODE".
- New adjustment of the level probes in the event of scale formation on the probe stick
- Execution of a general operation check
- Operational check of the pipe diverters, filters, excess pressure flaps on both the silos and the receiver vessels

- Check of the conveying pipe with regard to scale formation. In most cases, scale will form up only in pipe bends. Mount a bend at the end of the conveying pipe for control purposes. A cleaning procedure is required if the conveyance is troubled through the scale formed up inside the tube (frequent clogging of the line).

7.5 INSPECTION OF THE BLOW VESSEL (PRESSURE VESSEL)

Normally, the construction and design of the pressure vessel used with the conveying system described herein, complies with the regulations established by the TÜV Germany (technical inspectorate, officially authorized inspection agency) or, if so required, also with the regulations established by the TÜV Austria or those established by the Swiss SVTI (SVTI = Swiss Association for Technical Inspections). It is of great importance that the customer provides one copy of the two also provided acceptance attests (design & construction and pressure test) to the competent, recognized inspection agency. It is, beyond that, also important to ensure that the second copy is available in the customer's facilities for use within the limits of recurring inspections. This arrangement, however, does not apply with regard to pressure vessels with which the produce made up of the admissible maximum working pressure times the gross volume in litres ($p \times \text{Vol.}$) does not transcend a certain value that is officially acknowledged in the country within which the machine is operated (TÜV Germany, f. ex.: $p \times \text{Vol.} \leq 200$). Regarding these cases, the presentation of a corresponding manufacture confirmation concerning the execution of the necessary design & construction and pressure test will suffice.



Note

The putting into circulation of pressure equipment the characteristics of which do not comply with the requirements specified and laid down in the harmonised European Pressure Equipment Directive PED97/23/EC, is, as of 29th May 2002, is prohibited. In order to meet with these requirements GERICKE designs the pressure equipment offered by it in conformance with the AD2000 regulations.



Caution

The pressure vessel needs to be checked and inspected in accordance with the applicable national regulations. The recurring inspection times need to be fixed by the national supervisory body in cooperation with the operator of the machine.

8 CLEANING



Danger

With toxic or otherwise dangerous products the safety data sheet generated with regard to this particular product must be consulted.

8.1 OUTSIDE CLEANING



Danger

Prior to the execution of all works described hereafter, the conveyor must have been discharged, exhausted and disconnected from the power supply and be protected against an unintentional re-start.

Depending on the degree of the contamination or type of dirt:

- Cleaning by way of vacuuming
- Wiping or sweeping off
- Wet cleaning with water

8.2 INSIDE CLEANING

The cleaning of the machine inside depends exclusively on the individual situation and case and can therefore not be specified in more detail. In many cases, however, the purging of the blow vessel and the conveying pipe will suffice (see sub-section 4.6.1). The blow vessel can, for a more careful and thorough clean-up, also be filled with a cleaning fluid (solution consisting of water and special solvent) which, after that, is being conveyed through the conveying pipe. Prior to that, it must be ascertained whether or not the subsequent parts, elements and components of the overall system (receive vessel, filter(s), etc.) are at all suited for the execution of any such wet cleaning procedure! After wet cleaning, air must be admitted for drying.

9 REPAIRING OF FAULTS



Danger

Trained personnel only may remove, remedy and/or fix faults and/or malfunctions occurred with the conveying system. Certain faults will be indicated on the display of the control system (STP-51, for ex.). Regarding thereto, please refer to the separate operating instructions established for the control system (STP-51, for ex., section 10.4).

9.1 MALFUNCTIONS, REASONS AND REMEDIES

Type of fault / malfunction	Reason	Remedy
Conveying pressure too high or little or no product in the conveying pipe	Formation of product bridges inside the blow vessel by reason of the formation of scales or lumps in the outlet cone	Clean and remove lumps
Conveying pressure too high, pipe clogged	Pipe diverters leaky	Check and repair
	Gasket projecting into the conveying pipe	Check and cut out
	System settings changed	Check using the setting protocol
	Load too high	Change the timer cycle times as explained in sub-section 6.4 herein
	Conveying air volume too low	Increase the Laval nozzle inlet pressure
	Pressure in the conveying air network insufficient	Check and search for the cause
	Locking organs or safety valves leaky	Check by putting the blow vessel under pressure (see sub-section 5.4.1)
	Formation of scales in the conveying pipe	Check (all bends in particular) and clean
	Pulsator valve Y5 does not open	Repair
	Blow vessel air valve X4 defective, doesn't close anymore	Repair
	Product rushes into the conveying pipe during the feeding of the blow vessel	No outlet valve installed or outlet valve defective (to be repaired)
Conveying pressure too low, conveying performance too weak	System settings changed	Check using the setting protocol
	Locking organs or safety valves on the blow vessel leaky	Check by putting the blow vessel under pressure
	Formation of ratholes or funnels in the blow vessel cone due the formation of scales	Check and clean
No conveyance	No compressed air available	Check the compressed air network and the related fittings
	Solenoid valve coil defective	Check

9.2 FAULT INDICATION ON THE DISPLAY OF THE CONTROL SYSTEM (STP-51, FOR EX.)

See separately furnished operating instructions.

10 DISPOSAL

The dense-phase pulse cycle conveyor is a long-lasting and solidly constructed machine. Should it nevertheless be necessary to dispose it of, this can be done in different ways:

- The device can, in clean condition, be returned to its manufacturer. GERICKE will then take charge of its competent disposal. The costs incurred for the environment-friendly and professional disposal will be billed to the customer.
- The customer himself undertakes the disposal of the device. The actual system consists of electronic components (separate disposal required) and of parts of synthetics, plastic and metal. For disposal, the system must be disassembled completely and the different parts be assorted according to the different material groups. The disposal of the different materials or material groups thus obtained must be effected via the local waste recycling and disposal companies or via the competent authorities.

11 LIST OF ADRESSES


Internet: <http://www.gericke.net>

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